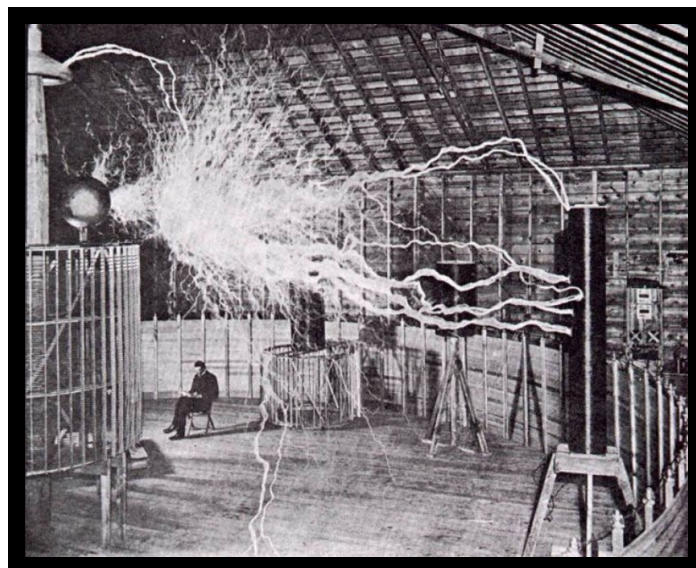


**“Beyond Renewables:
Re-inventing Sustainable Power Generation by
Tapping the Zero Point”**

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Nicola Tesla and the Tesla Coil, 1898

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1. Executive Summary:

This paper assesses the prospect of developing a fundamentally sustainable energy source. An environmental, humanitarian, and political crisis of almost unintelligible scale is precipitating. Solutions are demanded, and solutions that

are commensurate with the scale of the problems. These are problems never before considered by humanity, thus humanity must seek solutions that are beyond 'convention', solutions that are 'outside of the box'- solutions that can revolutionize the way we live and act.

'Conventional' renewable energy sources are not proving sustainable, because energy is defined as sustainable when it meets the requirements of being environmentally inobtrusive and non-destructive, politically and economically viable, as well as being technically feasible, and feasible on a global scale. An energy source that is sustainable would have to meet the growing demand for energy that is predicted, as well as be feasible to utilise within the very near future. The problems highlighted by the Stern Review cast the importance of finding such a sustainable energy source into stark relief.

The Stern Review recommends 'technology co-operation' and unprecedented investment in mitigating the effects of climate change. It is clear that the Stern Review, when seen in combination with the peaking of the global oil supply and the realities of climate change, presents an economic case for an end to the 'business-as-usual' attitude to these problems. Indeed, it is recognised that a genuine revolution is called for- a revolution towards sustainable energy – something required to avert the 'megadeath' that climate change and peak oil may cause.

Such a potentially sustainable energy source is known as 'Zero Point Energy' (ZPE). Suppression of certain knowledge and resistance to change has characterized much of human history, thus there is understandably a level of resistance to the consideration, let alone the acceptance, of ZPE technology. However, the world has entered an unprecedented period of environmental, economic and political interdependence and crisis, predicating the necessity and removing the obstacles to developing and deploying ZPE technology. The possibility of delimitation of energy supplies is both real and approaching, demonstrated by several types of viable and verifiable ZPE devices. The process of 'tapping' Zero Point Energy is briefly described and then potential impacts of

developing such a technology are assessed. These include domestic and industrial uses; space-age technology; wireless energy transmission; de-carbonization of the atmosphere, helping to slow global warming; anti-gravity technology; industrial, commercial and residential waste processing into oil by thermal depolymerization; and transmutation of elements.

Such developments would need investment, however, and even a small amount of investment might result in massive change. Scenario planners confirm that expected rates of change persistently under-predict speed of new developments. The potential significance and value of such developments are then assessed within political and economic and philosophical frames of reference.

It is concluded that the potential implications of developing this technology are impossible to grasp accurately. However, it would necessitate a level of restructuring not seen since the industrial revolution. Economically, it would imply a delimitation of energy supply and thus a fundamental reduction in costs, the obsolescence of the oil/gas industrial complex, and more. This would represent a dramatic move towards a global 'post-scarcity' society. Politically, it would require a revolution in the politics of energy, especially if a ZPE device were produced outwith and independently of the dominant oil/gas cartel, potentially 'democratizing' access to energy.

Philosophically, this could represent a significant departure from established norms and possibilities, and the development of a 'New Ecological Paradigm'. 'Techno-phobes' and 'techno-philos' differ on the 'utility' of such a development. Ultimately sustainability demands that complex societies develop 'advanced' technology, since civilisation presupposes technological dependence.

2. Introduction:

2.1. Scope and Content

Civilizations rely on energy to operate, and a source of sustainably produced energy is a prerequisite for a sustainable society and civilization. Thus this paper will address the possibility of developing a non-conventional source of sustainable energy, known as Zero-Point Energy (ZPE). There is a current lack of purely academic articles relating to the subject matter dealt with herein: by definition this ‘zero-point’ energy source is currently non-conventional; research into it is in relative infancy, and so it is hoped that the inability to include exclusively peer-reviewed articles as references is both acceptable and understandable.

The scope for such a paper is necessarily wide in this regard, for to narrow it would be to decontextualise the content and leave potential for misunderstanding. With that said, there is a preponderance for focussing on the general issues that arise concerning ZPE, but this is balanced by the selective use of specific discussions and examples to back up the general points. In this way, the paper will address both the narrow context of possibilities of ‘tapping’ ZPE by looking first at the need for a sustainable energy source of a non-conventional type. At this point the Stern Review is considered critically in relation to energy production. The actual science and practicalities involved are next briefly considered, as are implications of having available a ‘free’, i.e. ‘unlimited’ (as opposed to economically ‘free’) energy supply. Having addressed these issues, the context is extended to include the broader social, environmental, political and economic contexts within which such a development would take place. Finally, the even broader philosophical and psychological implications are considered of utilizing ZPE for electricity generation, while the conclusion relates this all back to the question of whether we can develop such a technology and use it well. For each context both the affirmative and negative aspects of ZPE development are considered. The conclusions drawn are a result of this analytic process.

2.2. Utopia or Oblivion? ‘Sustainable Energy or the Death of Civilization’

For industrialized nations, much of that energy relied upon is electrical or chemical energy. An electricity supply would be sustainable when it is renewable, non-polluting, cheaply and widely accessible, non environmentally damaging or invasive. Unfortunately, it will be seen that no electrical energy source has yet met all these criteria- thus as it stands our civilization is currently ‘doomed’. Civilizations tend to develop- stasis is rare, if not impossible, and in a state of flux new predicaments and problems constantly arise.

Civilizations tend to develop more complex structures to meet new needs, because of demographic inflexibility and density, as well as a perennial desire for convenience, comfort, security and efficiency.

This results in both vertical differentiation and horizontal specialization.¹ Potentially, a civilization that cannot manage and meet new needs as they arise will collapse, especially if that civilization is burgeoning and thus changing faster than it can accommodate. Our global ‘energy subsidy’ of fossil fuels is now under threat for several reasons- energy dependence is a problem for nation-states, the climate change agenda makes continued fossil fuel exploitation difficult, while oil supplies are ‘peaking’.

3. Contextual Analysis I: The need for Sustainable Energy

3.1. Assessment of the Stern Review in relation to Climate Change

The government is going to have to stop looking for an easy fix to our climate change and energy crises²

Jonhathan Porritt, SDC Chair

Britain is undergoing an energy crisis- she is heavily reliant on gas and oil imports while her nuclear plants are all aging, fast.³ However, this paper argues that Mr Porritt is absolutely and unequivocally wrong- Britain is not actually looking for a ‘fix’ at the moment- Britain is actually looking at options which can only create more problems. Britain must start looking for a ‘fix’ that is commensurate with the crises faced. This means thinking ‘outside the box’.

World oil supplies are predicted to peak in 2008-2010 and from then on the price of oil will presumably rise almost inexorably. Britain is (arguably) currently heavily involved in strategic military and non-military interventions arguably to secure oil in the Middle East. This is a strain on both the political situation at home and the British Defence Budget. A ‘free’ source of energy would solve the energy crisis as well as end energy dependence and the problems that are associated with it.

The Stern Review reflects this need for urgent action and recognises political ‘lag’ and ‘drag’ when it comes to action:

“The world has to act now on climate change or face devastating economic consequences”⁴

The Stern Review

The Stern Review paints a stark relief of the urgency of the global climate crisis, contending that with ‘business as usual’, 40% of species could face extinction because of climate change⁵. Briefly, there will be

¹ Tainter, A., *The Collapse of Complex Societies*, Cambridge University Press, Cambridge (1988) pp32

² ‘No Quick Fix’ From Nuclear Power, The BBC, (March 6 2006) World Wide Web:

<http://news.bbc.co.uk/1/hi/sci/tech/4778344.stm>, last accessed, 23/02/2007

³ Ibid.

⁴ Stern N, *The Stern Review*, (2006) World Wide Web: www.hm-treasury.gov.uk/media/8AC/F7/Executive_Summary.pdf, last accessed, 23/02/2007

⁵ Ibid.

more examples of extreme weather patterns. Melting glaciers will increase flood risk, crop yields will decline, particularly in Africa, rising sea levels could leave 200 million people permanently displaced. Indeed, carbon emissions have already pushed up global temperatures by half a degree Celsius, while if no action is taken on emissions, there is more than a 75% chance of global temperatures rising between two and three degrees Celsius over the next 50 years. ⁶There is a 50% chance that average global temperatures could rise by five degrees Celsius. Such a scenario would be catastrophic: If temperatures rise by five degrees Celsius, up to 10% of global output could be lost. The poorest countries would lose more than 10% of their output, and in the worst case scenario global consumption per head would fall 20%.

Action required by the Stern Review is so drastic utilising current technology that it is almost unthinkable: to stabilise global temperatures at manageable levels, global emissions would need to stabilise in the next 20 years and fall between 1% and 3% after that. This would cost 1% of global GDP under current technological constraints.

The Stern Review effectively describes this global crisis. However, the Review is less effective in describing how these effects can be mitigated against, since it depends on the global community taking infeasible, even anti-democratic measures. What is proposed is to “make global energy supply more efficient” and to act on non-energy emissions - preventing further deforestation is said to potentially go a long way towards alleviating this source of carbon emissions. Stern also proposes to promote cleaner energy and transport technology, with non-fossil fuels accounting for 60% of energy output by 2050. Such steps would make a significant greenhouse gas emissions reductions possible. However, rigid socio-economic structures and interests make significant developments in these areas unlikely at best.

Indeed, “The adaptation agenda is somewhere between embryonic and heavily under-developed” says Kevin Watkins, author of the UNDP Human Development Report 2006, *Beyond Scarcity: Power, Poverty and the Global Water Crisis*⁷.

3.2. Rising Demand – Population Implosion and the Energy Subsidy

Above it is explained that ‘energy subsidies’ are necessary for continued and increased productivity. [see Appendix 2] For every calorie of food consumed in the US, 10 calories of energy are expended. Thus it is clear that energy is both indispensable to modern civilization and a precondition for it. To renounce the value of ‘subsidized’ energy would be to renounce the expediency, material benefits and quality of life they afford- they allow the furnishing of necessary goods and services which facilitate society’s function.

3.3. The Peak Oil Crisis

⁶ Ibid.

⁷ Watkins *et al.*, *Beyond Scarcity: Power, Poverty and the Global Water Crisis* UNDP Human Development Report 2006; World Wide Web: www.hdr.undp.org/hdr2006/

Current ‘energy subsidies’ are doomed. Peak oil is a term used to describe the peaking of global oil supply, predicted by 2020 in *Science*.⁸ For example, today's total oil supply is estimated at between 2,000 and 2,800 billion barrels.⁹ About 900 billion barrels of oil have already been consumed, 28 million barrels of that just in the year 2000.¹⁰ Almost everything in modern society - vehicles, buildings, bridges, weapons, consumer products, and much more - consumes oil in its manufacture, its operation, or both, thus we live in an age of ‘embodied energy’. Agriculture is a prime example of an energy sponge dependent on fossil fuels. For example, Giampietro and Pimentel found that 10 kcal of exosomatic energy are required to produce 1 kcal of food delivered to the consumer in the U.S. food system¹¹. Today, fossil fuel energy has subsidised our way of living and allowed an unprecedented increase in population. This ‘population bubble’ in itself a ‘positive feedback loop’ because fossil fuel use allows expansion in urban, transport and agricultural infrastructure, which itself allows greater population growth and thus drives greater energy demand [see Appendix 3].

Moreover, statistics indicate that on a ‘middle course’,¹² our primary energy demand will still rise by 2050 to 20 gigatonnes of oil equivalent (Gtoe). Potential efficiency gains are dwarfed by the increasing volume of energy demand. This would represent a doubling of the current energy demand.¹³

3.4. *The Continuing Failure of Conventional Energy Alternatives*

Fossil fuels are running out, but it has not been emphatically demonstrated that conventional renewables are a viable substitute: they are neither necessarily clean nor economic.¹⁴ In an article in *Science*, November 1, 2002, eighteen experts reported that they examined all the *conventionally understood alternatives* to fossil fuels and found them all to have “severe deficiencies” in their ability to deal with environmental problems while also being adequate to growing planetary energy needs. Physics Professor Martin Hoffert, leader of that research group, told the press that the United States would have to undertake

⁸ Kerr, R., *The Looming Oil Crisis Could Arrive Uncomfortably Soon*, *Science* 20 April 2007: Vol. 316. no. 5823, p. 351

⁹ *The Development of Energy*, World Wide Web; <http://www.scienceclarified.com/scitech/Energy-Alternatives/The-Development-of-Energy.html>, last accessed on 23/04/2007

¹⁰ Kane, M., *Crossing the Rubicon: Simplifying the case against Dick Cheney*, (2004) From The Wilderness Publications http://www.fromthewilderness.com/free/ww3/011805_simplify_case.shtml, last accessed on 8/04/2007

¹¹ Pffeifer, *Eating Fossil Fuels*, From the Wilderness Publications (2004), World Wide Web, http://www.fromthewilderness.com/free/ww3/100303_eating_oil.html, last accessed 23/02/2007

¹² <http://www.worldenergy.org/wec-geis/edc/scenario.asp>, last accessed, 23/02/2007

¹³ Odell, P., *The Global Energy Market in the Long Term*, *Global Research*, December 14, 2004, The Royal Swedish Academy of War Sciences, - 2000-03-16, World Wide Web;

<http://www.globalresearch.ca/index.php?context=viewArticle&code=ODE20041214&articleId=310>, last accessed 29/03/2007

¹⁴ Bradley, R., *Renewable Energy: Not Cheap, Not Clean*, Cato Policy Analysis No. 280 August 27, 1997

an urgent energy research crash program, like the Manhattan atomic bomb project or the Apollo lunar missions. According to the *New York Times* (November 4, 2003, D1), Hoffert stated that we would need “Maybe six or seven of them [massive projects] operating simultaneously...We should be prepared to invest several hundred billion dollars in the next 10 to 15 years.” However, an investment of a fraction of that amount would be sufficient to complete verified research and develop a prototype of a working ZPE device. Indeed, Bradley claims that,

Even improved new generation renewable capacity is, on average, *twice* as expensive as new capacity from the most economical fossil-fuel alternativeevery major renewable energy source has drawn criticism from leading environmental groups: hydro for river habitat destruction, wind for avian mortality, solar for desert overdevelopment, biomass for air emissions, and geothermal for depletion and toxic discharges.

Even if the price of such technology is coming down and the technology is becoming less destructive and intrusive, the problems of price and feasibility (environmental and economic cost-benefit analyses) are still too significant to allow the rapid deployment of renewables to replace fossil fuels on the scale that is needed. Some examples will illustrate the point. To ‘run the world on biomass fuel’ would require dedicating an area comparable in size to all land now used for human agriculture¹⁵. In addition, considering that sun and wind energy are not constant, ‘tapping’ them on a significant scale would necessitate impractically large arrays of solar panels and turbines, as well as redesigned electricity grids with vast new storage mechanisms.

Nuclear energy has been touted as an answer to the problem of achieving cuts in green-house gas emissions required to mitigate the effects of climate change, however, research by the Sustainable Development Commission suggests that even if the UK's existing nuclear capacity was doubled, it would only provide an 8% cut on CO₂ emissions by 2035 (and nothing before 2010).¹⁶ Further principal arguments against developing nuclear power include the fact that no long-term solutions for the storage of nuclear waste are yet available, and storage presents clear safety issues and uranium supplies are too limited for the entire world's energy needs¹⁷. In addition, nuclear new-builds are uncertain projects economically, and they could tie the UK into a centralised energy distribution system for the next 50 years – a time when more flexible distribution options are becoming available.¹⁸ Developing new nuclear power makes it become more difficult to deny other countries the same technology, while plants are potential sources for dirty bombs or terrorist attacks or ‘freak’ disasters like Chernobyl.¹⁹ Environmentally they are far from benign – generating nuclear power involves uranium mining, transportation, infrastructure and

¹⁵ Weisman, A., ‘Mining the Imagination for New Energy: Scientists call for a research blitz targeting extreme possibilities’, *The Los Angeles Times*, July 25, 2004, World Wide Web; http://homelands.org/articles/mining_imagination.html, last accessed 13/04/2007

¹⁶ <http://news.bbc.co.uk/1/hi/sci/tech/4778344.stm>, last accessed, 23/02/2007

¹⁷ Weisman (2004)

¹⁸ <http://news.bbc.co.uk/1/hi/sci/tech/4778344.stm>, last accessed, 23/02/2007

decommissioning. British Energy have carried out a life cycle analysis for electricity supplied by Torness Nuclear Power Station, and they have found total life cycle emissions of CO₂ to be 5.05g/kWh.²⁰ This in many ways debunks the impression that nuclear power is a more climate friendly energy.

In the final analysis, the political factor is decisive. It is politically impossible to make the requisite investment in renewables because of the sacrifice it would entail- major resources would have to be diverted from elsewhere. Thus the will to make rapid changes that correspond to the need for change is frankly not there; we may well continue, like the proverbial Nero, to fiddle while Rome burns.

4. *Tapping ZPE*

4.1. *Theoretical physics*

Clarke and King claim that the scientific evidence taken to describe ZPE is only an interpretation, and a potentially flawed one at that.²¹ The overwhelming scientific weight, however, seems to indicate otherwise [see Table 1]. There is significant scientific evidence to support ZPE theory, even from such scientists as Tesla and Einstein- Tesla famously explained “Throughout space there is energy.”²²

Space can thus be said to be related to energy. The concept of zero-point energy was proposed by Albert Einstein and Otto Stern in 1913, which they originally called "residual energy" or *Nullpunktsenergie*.²³ More specifically, ZPE is a phenomenon of the quantum level. It is the energy that inheres throughout the fabric of space, also described as the lowest possible energy that a quantum mechanical physical system can possess, i.e. it is the energy of the ground state of the system. The recent discovery of this energy field has prompted inventors and physicists to look into the possibility of ‘tapping’ this field as a viable and ‘free’ energy source (i.e. a source that is inexhaustible, ubiquitous and clean – like tidal or wind power and ‘non-conventional’ because it is unorthodox). The matter impeding research into processes of tapping such energy are complex- vested political and economic interests are at stake, while the science is still not entirely conclusive. Below is a truncated table of literature to contrast ZPE theory with the denial of adequate evidence for ZPE:

ZPE AFFIRMATION	ZPE REJECTION
Puthoff, H., ‘Source of vacuum electromagnetic zero-point	Clarke and King, ‘Laszlo and McTaggart- in the Light of This

¹⁹ Ibid.

²⁰ World Wide Web, http://www.british-energy.com/documents/carbon_footprint.pdf, last accessed, 23/02/2007

²¹ Clarke and King, ‘Laszlo and McTaggart- in the Light of This Thing Called Physics’, *Network Review, Journal of the Scientific and Medical Network*, **92**: Moreton-in Marsh, (Winter 2006), pp6-11

²² Tutt, K. *The Search For Free Energy*, Simon and Schuster, New York, (2001) pp23

²³ Einstein and Hopf (1910). "Statistical investigation of a resonator's motion in a radiation field". *Ann. Phys.* **33**: 1105–1115. and Albert Einstein and Otto Stern, (1913). "—". *Ann. Phys.* **40**: 551.

energy' <i>Phys. Review A</i> 40 , 4857 - 4862 (1989) (Issue 9 – November 1989) Institute for Advanced Studies at Austin, Austin, Texas 78746 Received 24 May 1989	Thing Called Physics', <i>Network Review, Journal of the Scientific and Medical Network</i> , 92 : Moreton-in Marsh, (Winter 2006), pp6-11
King, M. <i>Tapping The Zero Point Energy: How 'Free Energy' and 'Anti-Gravity' Might be possible with Today's Physics</i> , Adventures Unlimited Press, Illinois (2002)	Yam, P., 'Exploiting Zero Point Energy, <i>Scientific American</i> , (December 1997), pp. 82-85., World Wide Web URL: http://padrak.com/ine/ZPESCIAM.html , last accessed 12/03/2007
Milton, K., <i>The Casimir Effect: Physical Manifestations of Zero-Point Energy</i> [e-book] Published World Scientific Publishers (2001), World Wide Web; http://books.google.com/books?id=hPb29d9HNFsC&dq=zero+point+energy , last accessed 14/03/2007	Daney, C., 'Zero point energy and the Casimir effect', <i>Science and Reason</i> , (September 17, 2005), World Wide Web, http://scienceandreason.blogspot.com/2005/09/zero-point-energy-and-casimir-effect.html , last accessed 14/03/2007

Table 1: Table of Articles- ZPE 'affirmation' and 'rejection'

Unlike certain perceptions, tapping of ZPE is not a wild refabrication of perpetual motion. Indeed, blanket statements about developments relating to physics and technology have tended to be wrong, for example, these include: "Heavier than air machines will never fly" (Lord Kelvin, 1890s); "We threw out all of the textbooks, and then we built the airplane" (the Wright Brothers); "The human body will not survive speeds of over 40 miles per hour" (early 1900s); and "Airplanes can not go faster than the speed of sound" (1940s)²⁴. Despite the failures and faults of science, Sargent explains that this ZPE extraction would not violate physical laws:

Any research that even hints at 'free energy' is instantly regarded as a misguided attempt at 'perpetual motion' by the conservative scientific community. In truth, however, utilising the ZPE is analogous to building a windmill or a hydro-electric dam. The energy is there; all we need to do is tap into it.²⁵

Technically, according to *Science*, Zero Point energy represents "the ultimate quantum free lunch"²⁶. Quantum theory predicts, and experiments verify, that so-called empty space (the vacuum) contains an enormous residual background energy known as zero-point energy or ZPE. This energy derives its name from the fact that at temperatures of absolute zero (- 273° Celsius), elementary particles continue to exhibit energetic behaviour²⁷.

²⁴ Bailey, P., *Zero Point Energy: the possibility of obtaining energy from space*, Presented to the International Forum on New Science, (19 September 1992), World Wide Web; <http://www.geocities.com/area51/shadowlands/6583/project114.html>, last accessed 12/04/2007

²⁵ Sargent, *Science and Technology*, Energy Grid Alternative Media, World Wide Web; <http://www.energygrid.com/science.html>, last accessed 20/02/2007

²⁶ Seife, C., *Quantum Mechanics: The Subtle Pull of Emptiness*, *Science* 10 January 1997: 158
DOI: 10.1126/science.275.5297.158a, last accessed 28/03/2007

²⁷ Ward, D., *Zero Point Energy*, Halexandria Internet Library (2003) URL: <http://www.halexandria.org/dward154.htm>, last accessed, 23/02/2007

Quantum mechanics also predicted that invisible particles could become materialized for a short time and that these virtual particle appearances should exert a force that is measurable.²⁸ Indeed, Newton is well known to have considered the universe as infinite, and proposed the existence of a balancing energy system that prevented the universe from collapsing in upon itself from Gravitational forces²⁹. This balancing energy is the over-unity energy of Zero Point. This 'vacuum energy' is a consequence of the uncertainty principle — one of the cornerstones of quantum mechanics.

Because of the uncertainty principle, subatomic particles or photons can appear spontaneously in empty space — provided that they promptly vanish again. This constant production and destruction of 'virtual particles' in a vacuum imbues the vacuum with a small amount of energy.

4.2. Practical engineering of a device

The feasibility of a ZPE device is confirmed supposedly by the existence of a working device providing electricity for the Methernitha Community, Switzerland. The ZPE device is known as the Thestatika machine, built by Methernitha's founder, Paul Baumann³⁰. This machine is said to produce electricity from 'free energy'. Although the Methernitha people have demonstrated their machine to many scientists, the mystery of its operation remains a secret. Despite the cause for disbelief in the functionality of the device, they assert that, "A trained specialist should remain free and independent in his thinking, and should avoid being limited by the temporal framework of publicly admitted knowledge in any science. It has to be remembered that the *established science has already been forced many times to change or give up some of its most fundamental concepts.*"

Others are working to produce a similar device: Dr. Fabrizio Pinto, formerly a physicist with the Jet Propulsion Laboratory, has obtained U.S. Patents entitled: "Method for [ZPE] Energy Extraction".³¹ He states: "ZPE is expected to exhibit infinite density and to be universally present, and might therefore be a limitless source of energy." His firm seeks to convert ZPE by means of the Casimir Force, a physical manifestation of ZPE discovered in 1947. Lucent's Bell laboratories announced, in 2001, that it successfully harnessed the Casimir Force to operate a miniature teeter-totter useful in advanced computer chips.³²

²⁸ Valone, T., *Inside Zero Point Energy*, World Wide Web; URL: <http://www.seaspower.com/InsideZeroPoint-Valone.htm>, last accessed, 23/02/2007

²⁹ Turnbull, H.W., (ed) *The Correspondence of Isaac Newton*, Vol III, Cambridge University Press (1961) correspondence 234

³⁰ Hehenkamp, C, *Methernitha* <http://www.spiritofmaat.com/archive/feb2/methnith.htm>, last accessed, 29/02/2007

³¹ Goldes, M., *New Science and a Revolutionary Energy Breakthrough*, Magnetic Power Inc (2005) URL: <http://www.zpenergy.com/modules.php?name=News&file=article&sid=1357>, last accessed, 23/02/2007

³² Ibid.

Some companies, such as Magnetic Power Inc.,³³ are already hoping to develop and roll out 1 kilowatt ZPE device aimed at the market for portable generators, as well as homes. Modules could be combined for greater power output, in a manner analogous to solar cells. Even compact automotive power systems, as well as megawatt modules, appear to be feasible.

Similarly, a the 'Perendev motor' claims to be the "the world's first fuelless magnetic engine."³⁴ A German company has licensed the manufacturing and marketing rights for all of Europe and Russia, excluding the U.K., and is in process of tooling up to begin mass production. The engines would be set to produce twenty kilowatts of power constantly, which is adequate to handle the peak load of most homes. Ran continuously at that rate, the excess produced during average use, which is five percent of peak use, could be sold to the grid for a quick return on investment, it is suggested.

Steorn is another company that claims to have produced 'free energy [See Appendix 4]. Steorn's took out an advertisement in *The Economist* in August 2006, which stated:

...we have developed a technology that produces free, clean and constant energy. Our technology has been independently validated by engineers and scientists — always behind closed doors, always off the record, always proven to work.³⁵

Conclusive corroboration is still needed for this claim and others, however. As of 18.04.2007, no evidence of the validity of Steorn's claims has been made available and no details of the technology have been publicly released. However, Steorn claims that there have been eight independent validations of their work conducted by electrical engineers and academics "with multiple PhDs" from world-class universities, but that none of these people is willing to go public for fear of becoming embroiled in a controversy.³⁶

If Steorn or a similar company gain credible recognition for a free energy device, the pace of distribution of devices and integration could be decidedly speedy and comprehensive, considering the global infrastructure and communications networks that already exist- global media, the internet, air-freight travel, mobile telephony. Indeed, we thinking about the future we tend to underpredict rates of change accding to MacKay and McKiernan.³⁷ Additionally, it opens a path to cost competitive electric power, automotive, and later aerospace propulsion. Currently, large sums of public money are spent on energy systems and centralized power grids that are relatively dirty, cumbersome, expensive, and vulnerable to modern terrorist attack and natural disasters. The distribution of Zero-Point Energy devices would make

³³ Magnetic Power Inc. *New Executive Summary Substitutes VPF for ZPE*. (November 14, 2005), ZPEnergy.com, World Wide Web, <http://www.zpenenergy.com/modules.php?name=News&file=print&sid=1610>, last accessed 14/03/20

³⁴ Allen, S., *Perendev is Tooling Up for Magnetic Motor Mass Production in Europe*, (June 29, 2004), Pure Energy Systems, World Wide Web; <http://www.pureenergysystems.com/news/2004/06/30/6900029PerendevPowerMagneticMotor/index.html>, last accessed 14/03/20

³⁵ "These men think they're about to change the world", *The Guardian*, (August 25, 2006). World Wide Web; <http://environment.guardian.co.uk/energy/story/0,,1858172,00.html>, last accessed 18/04/2007

³⁶ Ibid.

the current centralised grid system of electricity distribution obsolete by generating power where it is used.

4.3. Distributing ZPE

Successful adaptation to a sustainable energy source like ZPE depends upon technological advances, institutional arrangements, and availability of financing and information exchange. The IPCC reminds us that incorporating climate change concerns into resource use and development decisions and plans for regularly scheduled investments in infrastructure will facilitate adaptation.³⁸ Thus a plan to distribute operational ZPE devices world-wide would be a necessary result for effective action to ‘combat’ climate change.

4.4. Practical Problems

Despite these instances of seemingly successful development of such technology, and despite the history of non-conventional energy devices going back to Tesla’s time, misconception, lack of genuine debate and outright denial of the possibility of ZPE as an energy field and its potential to be tapped is still common [refer to Table 1].

Thus far, experiments with working devices have not reliably given positive results. As Steve K. Lamoreaux, at Los Alamos, says: "The zero-point-energy community is more successful at advertising and self-promotion than they are at carrying out bona fide scientific research."³⁹ Further criticism of zero-point energy production comes from Clarke and King, where they assert that the evidence for ZPE is inconclusive and to tap it is impossible: “it is natural for people to look into the rich and complex discipline of physics and be tempted to pick out just the bits that fit their concepts.”⁴⁰ This is not confirmed by the events that are unfolding, since, for example, an article in *Nature* explains that the ‘vacuum’ does contain energy and that tapping it would not violate “the fundamental laws of physics”- it is thus a a theoretical *and physical* possibility.⁴¹ Moreover, the Steorn Company and others have directly subverted that claim by Lamoreaux, for example, through Steorn’s Economist advertisement.

4.5 Political and Economic Implications- Energy Dependence, Money and Power

³⁷ MacKay and McKiernan, *The Role of Hindsight in Foresight: refining strategic reasoning*, Futures 36 (2004) 161-179, Elsevier

³⁸ Summary for Policymakers:Scientific-Technical Analyses of Impacts, Adaptations and Mitigation of Climate Change - IPCC Working Group II World Wide Web: <http://www.ipcc.ch/pub/sarsum2.htm>, last accessed 02/04/2007

³⁹ Ibid.

⁴⁰ Clarke and King, (2006)

⁴¹ Ball,P., ‘Movement from Nothing’, *Nature*, Feb. 2004 http://www.nature.com/Physics/Physics.taf?g=&file=/physics/highlights/6974-3.html&filetype=&_UserReference=C0A804F54651F06AE1CBD407899240295C0F, last accessed 02/03/2007

Having explained how and why an unprecedented demand and need for clean energy exists, there remains, however, a serious argument that while renewables may be politically and economically infeasible, ZPE technology is more so. Further comment exists on the nature of super-structures dictating 'world development', such as, for example, that the main motive in such continued suppression of alternative energy devices is preservation of demand for oil. Peter Lindemann suggests that an "energy revolution" could not occur "unless something really changes on the social or political or economic level, the technology is irrelevant; *it will not be allowed to happen.*"⁴² Having seen the new necessity for energy development and considered the economic arguments, such a view as Lindeman's cannot be supported.

Vested interests of the oil and gas cartels, combined with their powerful political lobbies make the development of ZPE technology a naïve dream, it could be argued. In response, there can be an appeal to the possibility of the political and economic interests of developers of this technology overcoming the vested interests of the cartels, since in a 'capitalist' system, both political forces and economic forces are constantly seeking new avenues for 'investment'. Indeed, the Virgin Earth Prize is one instance where economic forces compel the development of such technology despite the resistance.

On political-economic grounds, much of the subversion of the climate change and environmental agenda has resulted from the 'eco-modernist agenda', which stresses the mutuality of ecological and business interests. This depicts political and business interests as co-incidental with environmental and humanitarian interests, thus painting a win-win scenario for all.⁴³ ZPE technology development, however, would not represent such a case of eco-modernism. Indeed, such a technology would be beneficial to both business and environmental agendas. Competing business agendas, however need to be taken into account. The development of ZPE technology would have to 'outmanoeuvre' the vested interests of the dominant oil-petrochemical industrial complex. This both theoretically and practically feasible. Neo-Gramscian Theory explains that the "sensitivity to a strategic dimension of power suggests that intelligent agency can sometimes outmanoeuvre resource-rich adversaries"⁴⁴. The indication is that strategy and agency can overcome seemingly difficult obstacles to seeing through new developments.

When asked if the principle of his worldwide wireless system of "free energy" would upset the dominant economic system, Tesla replied "It is badly upset already."⁴⁵ This statement seems even more relevant today, considering the lack of investment in climate change mitigation technology, and considering the volatility of the global financial markets. In the film *Chain Reaction* Morgan Freeman briefly considers the

⁴² Manning, J., *The Coming Energy Revolution*, Barton Press, Philadelphia, (2006) pp57

⁴³ Hajer, M. *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*, Clarendon Press, Oxford (1995)

⁴⁴ Levy and Newell, 'A neo-Gramscian approach to business in international environmental politics: An inter-disciplinary, multi-level framework' (with David Levy) in Levy, D. and Newell, P. (Eds.) *The Business of Global Environmental Governance* MIT Press, (2005) pp 48

⁴⁵ *Tesla Harnesses Cosmic Energy*, Philadelphia Public Ledger, November 2, 1933. (cited in: Margaret Cheny et al. *Tesla, Master of Lightning*, Metro Books, New York (2001) pp142

notion of 'free energy'. He says, "That's a noble concept, but it would cause the collapse of the world's economy."

This collapse, however, is not a realistic scenario. The probable result would be quite the opposite: by utilizing a stable and accessible energy source such as ZPE, financial stability should be bolstered immeasurably because of increased stability of energy supply. Richard Heinberg is salient on this issue: "The economists typically view energy sources as inherently limitless. By that I mean they believe that the market will magically come up with a substitute whenever any given resource becomes scarce. In a certain way, they are right...⁴⁶" Indeed, neoclassical economic theory predicts that during reduced scarcity, the 'invisible hand' of the market will simply continue to match supply with demand. By delimiting the supply of energy, one will essentially open the possibilities for massive deflationary effects. Prices for all energy-embodied goods and services will potentially drop in relation to how much energy is needed to produce them. The counter-argument would assert that economics is in many ways, the management of *scarce* resources, and that economic activity would not exist if scarcity did not force people to make choices between particular uses of resources. But this is not to say that economic systems could not adapt to virtually limitless and sustainable energy supplies. Moreover, delinking economic activity from energy and materials (dematerializing) has already been occurring, with the growth of the micro-renewables sector and service sector respectively.

The Stern Review makes the reader aware of political and economic contexts of energy production: there is a need for international and co-operative need to cut greenhouse gas emissions. There it is argued that "Unless it's international [co-operation], we will not make the reductions on the scale which will be required."⁴⁷ The Stern Review forecasts that 1% of global gross domestic product (GDP) must be spent on tackling climate change immediately.⁴⁸ In the internationally arena, British investment in R&D of ZPE devices would keep her competitive.

In conclusion, the problem is so vast that Richard Branson has offered a prize of \$25 million US dollars to the individual or organisation that can develop the technology to extract carbon from the atmosphere.⁴⁹ Such scientific prizes have historically proven to provide a strong impetus to development of successful technologies.⁵⁰ As James Lovelock said, "To escape the consequences of global heating we need far more than Kyoto, far more than renewable energy and sustainable development. What we need is a near miracle

⁴⁶ Interview Transcription of Richard Heinberg on *The Party is Over*, *Financial Sense NewsHour with Jim Puplava*, W (2003) World Wide Web; <http://www.financialsense.com/transcriptions/2003/Heinberg.html>, last accessed, 23/02/2007

⁴⁷ The BBC, World Wide Web; <http://news.bbc.co.uk/2/hi/business/6096084.stm>, last accessed, 23/02/2007

⁴⁸ Stern, N. *The Stern Review: Executive Summary*, World Wide Web http://www.hm-treasury.gov.uk/media/8AC/F7/Executive_Summary.pdf, last accessed, 23/02/2007

⁴⁹ *Virgin Earth*, Earth Challenge, World Wide Web; <http://www.virginearth.com/>, last accessed 12/03/2007

⁵⁰ Ibid. /News and Press release

to undo the harm that we have done. Sir Richard Branson's hugely generous prize could sow the seeds for a miraculous invention that would let us make a sustainable retreat to that lush and comfortable world we once knew. We have all spent far too long sleepwalking towards extinction."⁵¹

Dr James Hansen, Director of NASA's Goddard Institute for Space Studies: "I think we have a very brief window of opportunity to deal with climate change ... no longer than a decade, at the most. This is why I am supporting the Virgin Earth Challenge as a judge – we must explore all means, both known and unknown, to help alleviate this crisis." Tim Flannery, author of *The Weather Makers*, gave a stark warning on the cost of inaction: "If we continue as we are, humanity will so pollute our atmosphere this century that we will create another world, the likes of which has not been seen for 50 million years. And we will destroy human civilisation in the process."

Dr James Hansen, Director of NASA's Goddard Institute for Space Studies: "I think we have a very brief window of opportunity to deal with climate change ... no longer than a decade, at the most. This is why I am supporting the Virgin Earth Challenge as a judge – we must explore all means, both known and unknown, to help alleviate this crisis."

5. *Potential Environmental and Technological Impacts of Developing ZPE Technology*

The new paradigm would in some respects be defined by what new developments were made possible. The scope of this paper is too limited to consider them individually, but suffice it to say that by tapping a limitless energy resource, many unthought of things are made possible. These things include universal access to 'free' electricity and transmutation of elements. Decarbonization of the atmosphere, would become a possibility, allowing the slowing and even reversal global warming. Carbon capture and sequestration techniques are already being used and developed- carbon is concentrated and stored underground or under the sea. For example, some of these processes involve a stage in which the carbon dioxide is absorbed by a solution of an amine - in this reaction the carbon dioxide temporarily reacts with the amine, and when all the amine has reacted the solution is transferred to a reactor where the carbon dioxide is released and sent for storage. This is a way of concentrating the stream of carbon dioxide and separating it from the other gases in the atmosphere.

Anti Gravity machines could be developed using electro magnets, wireless power could be distributed globally, space propulsion would take on a new form⁵². The processing and de-radiation of nuclear

⁵¹ Ibid. /*The Judges*

⁵² King, M. *Tapping The Zero Point Energy: How 'Free Energy' and 'Anti-Gravity' Might be possible with Today's Physics*, Adventures Unlimited Press, Illinois (2002), pp19 ff.

waste could potentially be made possible, while thermal depolymerization of global municipal and industrial waste would be entirely feasible, rendering toxic waste into harmless hydrocarbons.

6. Contextual Analysis II : 'Paradigm Shifts'

6.1 Historical Context

"All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident."
-Schopenhauer⁵³

It is the contention in this paper that 'truths' about Zero Point Energy are undergoing all three stages synchronistically. In general terms, this is a pattern that repeats itself throughout history: structures of power/knowledge assume hegemony and are hard to dislodge even in the face of contradictions and contrary evidence. To take two well-known examples, five hundred years ago contemporary Western (meaning European) society believed that the Earth was flat and at the centre of the Universe. 'Heretics' were burnt at the stake. It wasn't until the Magellan expedition's circumnavigation of the globe in 1522 that the reality of a round Earth was finally acknowledged as being "self evident". Another example is that of Galileo: in the summer of 1632, a short time after the publication of the *Dialogue Concerning the Two Chief World Systems*, Pope Urban VIII ordered that printing of the book be stopped and an investigation begun.⁵⁴ Galileo was 'investigated' by the Spanish Inquisition and later forced to recant his assertions. The assertions were the earth revolved around the sun. Ironically, it was Aristotle in the 4th Century BC that had already proposed such a heliocentric theory, by noting the curvature of the horizon, the movements of stars and that one sees a ship's mast before it's bow as it approaches.⁵⁵

6.2 Sociological context

Against such problems, we must recognise certain realities. We live in an energy-dependent and energy-mediated age. Our civilisation, indeed, all civilisations, are predicated upon the use of certain technologies, and these technologies, as they develop, become intrinsic and integral to the functioning of the society; even to the point where they can direct the functioning of society (known as technological determinism).

⁵³ Paterson, A., *The Three Stages of Truth*; World Wide Web; Last Updated: 5 May 2006
<http://www.vision.net.au/~apaterson/social/truth.htm>, last accessed, 28/03/2007

⁵⁴ World Wide Web; www-groups.dcs.st-and.ac.uk/~history/HistTopics/Heliocentric.html - 53k -, last accessed 28/03/2007

⁵⁵ Aristotle, *On The Heavens*, Translated by J. L. Stocks, eBooks@Adelaide (2004), World Wide Web; <http://etext.library.adelaide.edu.au/a/aristotle/heavens/heavens.zip>, last accessed 28/03/2007

Failure to change *and increase* the energy base successfully at this juncture will result in a potential humanitarian catastrophe, considering what is at stake and that resource wars, mass die-offs and conflict have certainly characterized such failures of adaptation in the past.⁵⁶ Or, to quote Kunstler, we are trapped in a “shitstorm⁵⁷” of potential and immanent disaster. He uses this word specifically to shock people, since he claims people need to be shocked to feel the reality that confronts us.

To explain the lack of general recognition of the drastic situation the world is now in, Kunstler explains that we are also trapped in a “consensus trance⁵⁸” where those in power manufacture consent and consensus according to the dictates of government and the corporate-industrial complex. A trance escapes reality, because the reality of the situation is not and cannot be brought to terms with current beliefs and values. By understanding that there is a way forward, therefore, we can break free from such a ‘trance’ and enter a time of astonishing, productive and constructive development.

6.3. ‘Paradigmatic and scientific context’

Development of ZPE technology would require a transition of paradigm: Kuhn, in his *Structure of Science*⁵⁹, calls such an agreed upon achievement a paradigm or exemplar, and points to Newton’s *Principia* as a good example. The ideal of normal science is that these anomalies will eventually be shown to be compatible with the theory. If incompatible, a ‘paradigm shift’ would eventually result centred around a new explanation of the phenomena. If compatible, the process of normalization will ensue, because of ‘the set up of normal science and normalizing society as totalising fields of activity which continually extend their range of prediction and control.’⁶⁰ Quantum science and modern engineering technology produce anomalous results that must be assimilated by science in this regard.

Paradigms are social phenomena also:

A social paradigm contains survival information need for the maintenance of a culture. It results from generations of social learning whereby dysfunctional values and beliefs are discarded in favour of those more suited to collective

⁵⁶ Tainter (1988) pp10-11

⁵⁷ World Wide Web; <http://www.atlanticfreepress.com/content/view/957/81/> , last accessed 4/03/2007

⁵⁸ Ibid.

⁵⁹ Kuhn, T., *The Structure of Scientific Revolution*, Chicago University Press, Chicago, (1962)

⁶⁰ Ibid. pp198

survival. It is extremely difficult to dislodge important elements of a dominant social paradigm once it becomes firmly entrenched because the individual integrity and socially shared definitions of reality are anchored in it.⁶¹

It may be difficult to dislodge elements of the dominant paradigm ,however, it is necessary *and inevitable*, since new information and elements are now necessary for ‘collective survival’. Paradigms are all permeable and transitive, however, and are constantly assimilating and discarding now or old beliefs, values, norms and information.

In terms of systems analysis, for Meadows, “Paradigms are harder to change than anything else about a system...but there’s nothing necessarily physical or expensive in or even slow in the process of paradigm change.”⁶² Some reasons why the paradigm needs to change and must change will be considered- specific environmentally unsustainable practices of greenhouse gas emission and the shortening of the physical supply of oil, for example. The equally (or more) important economic factors allowing such a shift would occur are treated below.

Grounding the theory again in history, an example of this can be taken from the suppression of Nicola Tesla’s Wardencllyffe Tower Project, which was a project to transmit radio communication and electricity power wirelessly across the globe. Funding for the project was ended by J.P Morgan, when he wanted to know, “Where can I put the meter?”⁶³. This triumphal act of repression and relegation is bound up in complex socio-economic, political and knowledge/power normalizing structures. If normalization cannot assimilate an anomaly, either a new paradigm is accepted or the anomaly is suppressed. Indeed, according to Meadows, “the higher the leverage point, the more the system will resist changing it- that’s why societies tend to rub out truly enlightened beings.”⁶⁴

Many factors have resisted change to scientific revolution in the past. These ‘ideological pathologies’ are a cause for concern because they are unjustifiably sceptical and overtly prioritise perceived orthodoxy. *Nexus Magazine* contends that,

“the spread of free energy technologies has been prevented by wealthy elites, governments, deluded inventors and con men, as well as a non-demanding public.”⁶⁵

⁶¹ Pirages, D. ‘The Origins of Ecopolitics’ form R Flak, S. Kim and S. Mendlovitz (eds), *Towards a Just World Order* Vol. 1 . Westview Press, Colorado, 442-446 (1982), pp7

⁶² Meadows, D., *Leverage Points: Places to Intervene in a System*; The Sustainability Institute, Hartland (1999) pp18

⁶³ Rather, J., "Tesla, a Little-Recognized Genius, Left Mark in Shoreham". The New York Times. Long Island Weekly Desk.

⁶⁴ Meadows, (1999) pp19

⁶⁵ *Where in the World is all the Free Energy?* Nexus Magazine, Volume 8, Number 4, (2007-06-07), World Wide Web ; www.nexusmagazine.com/articles/freeenergy.html, last accessed, 23/02/2007

Challenges to the orthodoxy appear and build in strength, the need to restructure is realised, and this connects with a vision of how that restructuring is possible. For change to occur, faults in the system need to be presented with viable and attractive alternatives, and it is only at this point in time that faults in our current system of electricity and power generation and economic activity can be improved upon, since sustainability demands it.

This ‘paradigmatic shift’ towards a New Ecological Paradigm would include the recognition of the current paradigm of subjectification and objectification, and totalizing normalization. The shift would thus include an attempt to move beyond these things, leading to a more developed awareness about the nature of knowledge and science. Acknowledging that their perception of reality may no longer be applicable in the light of new evidence usually presents humans with the uncomfortable choice of dispensing with a paradigm that they are used to in favour of a something new, uncertain and yet to be properly defined. One potential form of such a paradigm is that ZPE development it could lead to the democratization of power by making its benefits accessible to all.

7. The need for new values to guide ZPE development

7.1. Technology’s context in Philosophy and Psychology

At this point it must be considered whether the prospect of ‘free energy’ would truly solve problems with sustainability or not, especially considering that by producing large amounts of energy, this energy could be used ‘destructively’. Elliot makes the salient point that:

All the technological knowledge in the world does not necessarily lead societies to change environmentally damaging behaviour. Hence, a critical understanding of socio-economic, political and cultural structures and processes has become, it is acknowledged, of central importance in approaching environmental problems.⁶⁶

A brief assessment of some of these structures has already been made. Indeed, technological ‘progress’ does not occur within an ideological and economic bubble. There seems to exist a sliding scale of thought from the vehement anti-technologists to the avid technocentrists. Anarcho-primitivists and anticivilisationists view technology itself as evil⁶⁷. Indeed, deep environmentalists lack faith in technology because of a perceived need for elitist expertise, central authority and inherently undemocratic institutions⁶⁸. They believe that materialism for its own sake is wrong, and that nature has intrinsic importance. ‘Technocentrist cornucopians⁶⁹’, on the other hand, tend to embrace each new technological

⁶⁶ Elliot, D. *Energy, Society and Environment: technology for a sustainable future*, Routledge Press, Cambridge, 1997

⁶⁷ *Primitivism, anarcho-primitivism and anti-civilisationism – criticism* Updated October 12th, 2006 World Wide Web, <http://libcom.org/thought/anarcho-primitivism-anti-civilisation-criticism>, last accessed, 02/04/2007

⁶⁸ Warren, C., *Managing Scotland’s Environment*, Edinburgh University Press, Edinburgh (2002), pp319

⁶⁹ Ibid.

development as a sign of ‘progress’, because scientific and technological knowledge is vital to public health and sustainability of civilisations.

The most sustainable and balanced approach seems to be to accept that there is truth in both sides of the argument. One can avoid any such dogma, however, if one simply assesses each potential development on its own merits, in its own context. It has been seen that the potential benefits of such technology are enormous, almost incomprehensibly so, and after all, even the simplest of ‘technologies’ can be used well or badly. Technology is a double edged sword- but one which we cannot avoid wielding. Thus we must learn to utilise it for the benefit of all.

A comfortable, smooth, reasonable, democratic unfreedom prevails in advanced industrial countries, a token of technical progress. Indeed, what could be more rational than the suppression of individuality in the socially necessary but painful performances...

Herbert Marcuse, *One Dimensional Man*⁷⁰

In the above excerpt, Marcuse explains how current technological trends have freed us from material need in industrial society, but have led to a “smooth, reasonable, democratic unfreedom” by virtue of our dependence on and reflection of technological rationality and determinism. Not all technological progress, however, has to reinforce this trend, however. For true ‘sustainability’, humanity must begin to better grasp our active and inescapable role in constructing the reality in which we live, and so we can begin to reverse an artificially-constructed, technology-centered social system built on principles of standardization, efficiency, linearity, and fragmentation.

Indeed, must revolutionize ourselves so that we can revolutionize our politics and our economics. Kant claimed that we must see our fellow man as an *end* not a means⁷¹. But this is not enough. We must see both man and ‘nature’ as the ‘end in itself’. Only then will we develop the respect that is required to deal with ourselves and the natural world sustainably. Technology, then, essentially becomes the *means* and only the means. In this way, as Pope points out, we must re-define our aesthetics to co-incide with our needs and the needs of the planet.⁷²

⁷⁰ Marcuse, H. *One Dimensional Man*, Routledge and Kegan Paul Ltd., London (1968), pp1

⁷¹ Kant, E., *Groundwork for the Metaphysics of Morals*, trans. H. Paton, Hutchison Press, (1969) pp27

⁷² Pope, R. *Re-defining aesthetics to develop human survival technology*, Murwillumbah, N.S.W. : Science-Art Research Centre of Australia, (2006)

Within our social system, technology influences society. The automotive industry completely reorganized American society in the twentieth century⁷³. Likewise, nuclear weapons define global politics. At the same time, society reflects the technological ethos. In this way, ZPE technology could come to represent a new paradigm of 'abundance' and relative 'freedom'. Access and 'ownership' of energy could become a reality for all. Marx explained that true freedom could only come about when man was free from resource constraints which ultimately shackled him- creating the necessary 'unfreedom' of political economy⁷⁴. ZPE technology could provide the impetus to attaining such a position of true and global 'post-scarcity' and therefore the end of the need for exploitation, class struggle and conflict.

On the other hand, some might imagine ZPE development resulting in the ultimate (to borrow from Mumford) "mechanical order" or the "megamachine"⁷⁵. To live within a purely technological construct, totally removed from 'nature' and traditional values might cause dangerous imbalances- Schwartz warns of the dangers of technology becoming our ideology. Glendining suggests that we have already come too far down the technological path, to the point where trauma sets in: she says, "The hallmark of the traumatic response is dissociation: a process by which we split our consciousness, repress whole arenas of experience, and shut down our full perception of the world."

Langdon Winner, in *Autonomous Technology*, moves the idea further, arguing that the artefacts and methods invented since the technological revolution have developed in size and complexity to the point of cancelling our very ability to grasp their impact upon us.⁷⁶ The socially structured scientific-technological reality that now threatens to determine every aspect of our lives and encase the entire planet is out of control, he asserts. The very conception, invention, development, and deployment of new technologies involves a highly undemocratic social process that is rationalized as "progress."⁷⁷ [see Appendix 5]

Ultimately, however, there are potentially huge and immediate benefits to the technology and relatively much less certain and severe costs. As long as these dangers described are recognized, it should be possible to benefit significantly by gaining relative 'freedom and abundance' from such a source of Free energy.

⁷³ Glendining, C., *Technology, Trauma, and the Wild*, (2006) Primitivism.com, <http://www.primitivism.com/technology-trauma.htm>, last accessed 18/03/07

⁷⁴ Marx, K. *Capital : a critique of political economy*, introduced by Ernest Mandel ; translated by Ben Fowkes (v.1) and David Fernbach (v.2,3).:Penguin, Harmondsworth (1976-81)

⁷⁵ Ibid.

⁷⁶ Glendining, Chelis, *Technology, Trauma, and the Wild*, <http://www.primitivism.com/technology-trauma.htm>, last accessed, 02/04/2007

⁷⁷ Ibid.

8. Conclusion: ZPE- “More than a ‘Techno-Fix’ ”

The scope of potential application of delimited energy is vast, however this should not be seen as merely a ‘techno-fix’ which is potential a panacea for environmental and social problems. There is no silver bullet that can provide all the answers. The value of developing such technology would be non-existent if delimited energy were to be used for ‘destructive’ purposes. The sustainability of an energy, therefore, depends as much on the source as on its use. The danger of developing this technology is not greater than other technological innovations in this regard: a knife can be used to kill or to spread butter.

ZPE would be a radically different solution to environmental problems, compared with some: for instance, a proposed U.S. government program promoted the plan to cover the oceans with polystyrene chips that, it is hoped, will reflect "unwanted" sunlight off the Earth's surface to reduce global warming rates. Similarly, some scientists suggest orbiting hundreds of satellites around the planet to block the sun's light⁷⁸. A ZPE device would be a technological innovation of a different kind, but ultimately sustainability requires a transformation of human values to the point where destructive and unsustainable activity ceases. To what extent this is possible is debatable, but such a paradigm shift of values would need to accompany the paradigm shift in energy supply. Just as combustion engines may be seen in the future as a relic of an unsustainable age, so to might weapons of mass destruction. Moreover, vision is an essential precondition for sustainable development, and creative vision requires a certain amount of the unorthodox.

Orthodoxy means not thinking — not needing to think. Orthodoxy is unconsciousness.

*George Orwell*⁷⁹

This paper deals with the need for unorthodox and non-conventional approaches to finding a sustainable energy supply. This paper has examined the unsustainability of current energy production by looking at the implications the Stern Review, as well as other sources. Amongst other things, the Stern Review suggests that ‘technology cooperation’ is needed and the approach adopted is to consider Zero Point Energy as such a sustainable source.

Zero Point Energy permeates the very fabric of our existence. ‘Quantum leaps’ in technological development have happened before and will happen again, and when they do they tend to coincide with a paradigmatic shift and a pace of change that was previously unimaginable.

⁷⁸ Mander, J. *In the Absence of the Sacred: The Failure of Technology and the Survival of the Indian Nations* (San Francisco: Sierra Club Books, 1991), p.179.

⁷⁹ Orwell, *Nineteen Eighty Four*, Penguin, Harmondsworth (1954), pp 57

Special controversy surrounds the question of whether it is possible to ‘tap’ ZPE to generate ‘unlimited’ electricity. The science is compelling, but shrouded in potential misapprehension and misinterpretation. What is certain is that conventional alternative energies are currently providing too little energy too late to meet the world’s growing demand. Nuclear power is undesirable on many levels, while fusion power plants are at least 50 years away. On the other hand, ZPE is a potentially decentralised source of power that is relatively very cheap to develop and completely clean. Working ZPE devices are already claimed to exist and are in the process of being brought to the attention of the scientific community through scientific corroboration.

It could be argued that development of ZPE technology seems *necessary* to avoid future energy fossil fuel wars and cataclysmic climate change- complex civilizations require advanced technology. This is what Pope described as ‘Human Survival Technology’⁸⁰.

Hence there is an *urgent* need to invest time and money in ZPE research and development. Scientific claims at creating a successful free energy device should be both recognised and considered fairly. If ‘free energy’ is not developed soon, the political and environmental climate may well bring out civilization to its knees. If the right values and approach are adopted, ‘quantum’ leaps of development are possible. As Jung explains, “We make our own epoch.”⁸¹ The clear indications are that our current epoch of cheap fossil fuel usage must come to an end, and that certainly governmental, economic and political needs will not only not prevent the development of ZPE, but will positively encourage it.

Ultimately, we must concede an aspect of technological determinism latent in civilization, but we must make the best of this. As Milbraith points out, “out technological /industrial structure carries a momentum and an imperative that is almost irresistible; we can’t slow down or stop even if we would like to.”⁸² However, technological development can be combined with the intrusion of a ‘New Ecological Paradigm’ that will herald a true ‘Golden Age of Civilization’.

It seems that it is fitting to leave where Nicola Tesla left off:

“Throughout space there is energy, it is a mere question of time when man will succeed in attaching their machinery to the very wheelwork of Nature....the knowledge that there is throbbing through the earth, energy available everywhere, would exert a strong stimulus on students, mechanics and inventors in all countries. This would be productive of infinite good. Conditions such as never existed before would be brought about, it would enable Man to dispense with the necessity of burning of fuels, and so do away with innumerable causes of waste! New frontiers might be opened, unlimited power for all the world, inexpensive power for the farmer to light and heat his home, to drive his tractor, to

⁸⁰ Pope, R. (2006)

⁸¹ Jung, C.G., *The Collected Works of C. G. Jung*, edited by H. Read, M., Fordham, & G. Alder, Routledge and Kegan Paul, London (1953-78) Volume 10, Para 315

⁸² Milbrath, L. *Environmentalists: Vanguard for a New Society*, State university of New York Press, Albany (1984) pp12

harvest his grain, to increase his food output, electric power for millions of homes, so economical that every appliance could be operated electrically. The real beginning of a 'Golden Age of Civilization'.⁸³

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11. Appendices:

1. Collapse and Energy Needs:

Great wealth and power is predicated to an extent by complexity. Complexity, however, is potentially damaging to productivity:

FROM: Tainter, A., *The Collapse of Complex Societies*, Cambridge University Press, Cambridge (1988) pp28

“Typically, continued stresses, unanticipated challenges, and the costlines of socio-political integration combine to lower this marginal return [to complexity]. As the marginal return to complexity declines, complexity as a strategy yields comparatively lower benefits and higher costs. A society that cannot counter this trend, *such as through acquisition of an energy subsidy*, becomes vulnerable to stress surges that it is too weak and impoverished to meet, and to waning support in its population.”

2. Reliance on ‘Subsidized energy’

FROM: Interview Transcription of Richard Heinberg on

The Party is Over, *Financial Sense NewsHour with Jim Puplava*, W (2003) World Wide Web;
<http://www.financialsense.com/transcriptions/2003/Heinberg.html>, last accessed on 28/03/2007

“In the US for example, in 1850, something like 65% of all the work done in the economy was done by animal and muscle power, something like 15% of the work done in the economy was through human muscle power. By 1970 the amount of work done in the US economy by animal and muscle power had reduced to virtually zero and everything was being done by fuels. Meanwhile, the total amount of work done per capita had increased dramatically.”

3. The Population Bubble

Richard Heinberg eloquently illustrates this notion of population explosion and then implosion:

FROM: Interview Transcription of Richard Heinberg on

The Party is Over, *Financial Sense NewsHour with Jim Puplava*, W (2003) World Wide Web;
<http://www.financialsense.com/transcriptions/2003/Heinberg.html>, last accessed on 28/03/2007

“Up until the industrial revolution, the population of humans on planet earth had never exceeded one billion. In fact for most of our several million years on earth, we humans have numbered even less than 100 million. Around 1800, between 1800 and 1820 our numbers surpassed one billion for the first time. Now we are up to 6.3 billion humans and that is just over the course of two hundred years. It took us hundreds of thousands of years to get up to one billion and just two hundred years to move from one billion to 6.3 billion. That is an extraordinary rate of increase. If we saw this in any other life form, we would call it a *population bloom*. That is an ecologist term. You can see a population bloom for example if you put yeast in a vat of wine or grape juice, the yeast will wildly proliferate. Of course, the waste product of the yeast is alcohol, which is how you make the wine. Eventually, the waste product of the yeast begins to smother the yeast themselves and the micro-organisms themselves die off. Typically in ecological situations where you have a population bloom, it is followed by the population using up whatever temporary resource abundance has caused the population bloom and the population begins to *die off*. With human beings, what caused our population boom, without a doubt was the access to fossil fuels and this huge energy input into our societies....Now, food can be transported long distances. The average plate of food that Americans sit down to eat has traveled some 1300 miles, so it is perfectly practical to put 10 or 15 million people in Los Angeles or Phoenix, Arizona, where the available land and water couldn't possibly grow food for that many people. Cities like this where if people in those cities had to rely on local resources, they would not be able to sustain themselves. ... Also...we have doubled the amount of usable nitrogen in the biosphere by the Haber-Bosch process. That has extraordinarily expanded agricultural productivity. Altogether we have created the means for subsistence for well over five billion people, who otherwise would not be able to exist today and all depending upon fossil fuels.”

4. Stoern

The following is an extract from an article and interview in the Guardian.

FROM: "These men think they're about to change the world", *The Guardian*, (August 25, 2006). World Wide Web;
<http://environment.guardian.co.uk/energy/story/0,,1858172,00.html>, last accessed 18/04/2007

Certainly, the Steorn team seems genuine and well-intentioned. Walshe says that if the technology is accepted it will be licensed to manufacturers, but given away to electrical and water projects in developing countries. And, until their claims have been assessed by the jury, McCarthy says they won't be accepting any investor offers. So if this is a hoax, it would appear not to be a money-making scheme; Walshe says the Economist ad alone cost £75,000.

"Before we went public, we realised that if we're wrong it could have a very adverse effect on our business, so we're not doing this lightly," says McCarthy. "We expected stick, and we're getting it already. We've had a lot of abusive emails and telephone calls -people telling us to watch our backs, that sort of thing. Someone even published my home address on a website."

Instead of opening up their technology for public inspection, Steorn has pitched their claim directly to the media. This is considered by Dr Robert L. Park, a professor of physics at the University of Maryland at College Park, to be an important indicator that a scientific claim lies well outside the bounds of rational scientific discourse.⁸⁴

In particular, Steorn claims to violate the law using "a way to construct magnetic fields so that when you travel round the magnetic fields, starting and stopping at the same position, you have gained energy". Magnetism is a [conservative force](#), so it is well established that the energy of motion which one gains when two magnets attract or repel is exactly equal to the energy needed to restore the starting position, no matter how you arrange the magnets.⁸⁵

"We've been accused of being a publicity stunt for the next Microsoft Xbox gaming system because some of the artwork on our website was similar to theirs," says Walshe. "Some people have said our offices don't exist and one accused us of simply being a call centre in Australia because one of our telephonists has an Australian accent. My favourite is the one that says we are a CIA or oil-industry front intended to discredit research into free and clean energy. In other words, our claims are deliberately false and when they are found out to be, it will be a blow for all free and clean research."

Steorn says it has seven patents pending on its technology, though it is difficult to see what can be patented; magnets already exist and so do the 360 degrees of a circle. Yet it is the positioning of the magnets that seems to be at the heart of this "new" energy. And, as McCarthy points out, the Patent Office rejects inventions that fly in the face of such fundamental principles as, say, the conservation of energy. Nevertheless, as of yesterday, almost 3,000 people claiming to be scientists had expressed an interest in sitting on the Steorn jury. The 12 best will be chosen at the end of the month and then testing will begin.

"We've been advised it could take between a week and 10 years," says McCarthy. "We don't have any doubts. We've conducted meticulous research and we're getting such phenomenal results - up to 400% efficiency - that small glitches and errors in testing can be ruled out. We really believe we've found something that can change the world."

The rest of us can only wait and see. In the meantime, I ask Martin Fleischmann, the cold-fusion scientist, now 79 and retired, what he thought of the Steorn project.

"I am actually a conventional scientist," he says, "but I do accept that the existing [quantum electro-dynamic] paradigm is not adequate. If what these men are saying turns out to be true, that would be proof that the paradigm was inadequate and we would have to come up with some new theory. But I don't think their claims are credible. No, I cannot see how the position of magnetic fields allows one to create energy."

5. *Environmentalism and Technology:*

FROM: Allenby, B., *Environmentalism and Technology*, At&t, *Industrial Ecology Articles*, (2007), *World Wide Web*; http://www.corp.att.com/ehs/ind_ecology/articles/tech_env_2.html, last accessed 5/03/2007

Indeed, moderate ecologists can even maintain skepticism concerning technology. This reflects both skepticism about capitalism and the countercultural ideology that characterizes most environmental discourse. The precautionary principle is one tenet of certain environmental paradigms; it holds that no new technology be introduced until it can be demonstrated to

⁸⁵ <http://www.phact.org/e/wheel.txt>

have no harmful environmental impacts. Taken at face value, this embeds within it a strong preference for limiting technological evolution – considering that only the most basic developments in technology can have fully predictable consequences. Zero point energy is energy is produced cleanly- risks during production are almost non-existent. However, the use of such energy is not similarly risk free. It could potentially be used for military or destructive purposes. However, this potentiality cannot be cited as an argument against development: it is said that the knife can cut, but it can also spread butter. Thus the context of the need for ZPE technology and its potential benefits reduce the potential harms to insignificant levels.

Evolutionary sociology posits that cultures inevitably evolve, and generally towards greater complexity; consider, for example, how much more complex international governance, information networks, or financial structures are now than just a few years ago.

And technologies are evolving rapidly as well, particularly in the three areas that promise to impact environmental systems the most: biotechnology, nanotechnology, and information technology. The first will, over time, give us design capabilities over life; the second will let us manipulate matter at the molecular level; the third will change how we perceive and understand the world within which the first two are accomplished.

Moreover, developing such capabilities will give the cultures that do so significant competitive advantages over those that opt for stability rather than technological evolution. There are historical examples of this process - for example, China, from roughly the 11th to the 14th centuries. At that time, China was the most technically advanced society, but for a number of reasons its elite chose stability over the social and cultural confusion that development and diffusion of technologies (such as gunpowder and firearms) might have caused. Northern Europe, however, followed a more chaotic path, including the Enlightenment and the Industrial Revolution, which favored technological evolution. The result: Eurocentric, not Chinese, culture forms the basis of today's globalization.

Applying this lesson to current conditions raises the question of whether deep-green opposition to certain technological advances, especially genetically modified organisms, could halt technological advance. Some societies - Europe, in particular - may choose stasis over evolution. But biotech is such a powerful advance in human capabilities that other societies - especially developing countries with immediate needs that biotech can address - are not likely to forego its benefits. And to the extent their cultures become more competitive by doing so, they may come to dominate global culture.

So is the answer then to simply give up and let technology evolve as it will? Not at all. In fact, the essential problem with an ideological opposition to technology is that it prevents precisely the kind of dialog between the environmentalist and technological discourses required to create a rational and ethical anthropogenic earth. For technologies are not unproblematic, and their evolutionary paths are not preordained; rather, they are products of complex and little-known social, cultural, economic, and systems dynamics. It is important that they be questioned and understood.

The challenge is thus not unthinking opposition, or maintenance of ideological purity, or even meaningless repetition of ambiguous phrases such as "precautionary principle." It is far more demanding. It is to learn to perceive and understand technology as a human practice and experience, and to help guide that experience in ways that are environmentally appropriate.